

Patent Claims

1. Piezoelectric ceramic material
having the general composition ABO_3 ,
5 which essentially contains lead zirconate
titanate and comprises perovskite lattice structures,
wherein A stands for A positions and B stands for
B positions in the crystal lattice,

characterized by

10 a composition that contains at least a proportion
of lead zirconate titanate of the general formula

$Pb_{1-3x/2-y/2}SE_x\Box_{x/2-y/2}Cu^I_y(Zr_{0.5515-z}Ti_{0.4485+z})O_3$ wherein
0.01 < x < 0.04 and 0 < y < x/2,

15 wherein SE is a rare-earth metal, selected from
the group comprising La, Nd, Sm, Gd, Tb, Dy, Ho, Er,
Tu, Yb, Lu and Y,

wherein the parameter x is determined by the
valence of the rare-earth metal,

20 wherein the parameter z is selected based upon
the parameter y such that the ceramic material is
tailored to the morphotropic phase boundary.

2. Ceramic material according to claim 1,
in which Cu is inserted into the perovskite
25 lattice structure of the ceramic material at least
partially in A positions, wherein the Cu that is
inserted in A positions is present as a monovalent,
positive cation Cu^+ .

30 3. Ceramic material according to claim 1 or 2

with the composition

$\text{Pb}_{0.96}\text{Nd}_{0.02}\text{Cu}_{0.02}(\text{Zr}_{0.5515}\text{Ti}_{0.4485})\text{O}_3$.

4. Method for producing a ceramic material
according to one of claims 1 through 3,

in which a ceramic raw materials mixture
containing copper oxide CuO is prepared,

in which the ceramic raw materials mixture is
calcined under inert conditions, with the calcination
being performed in a reduced atmosphere under an
oxygen partial pressure,

at which Cu and copper oxide are in equilibrium
and coexist,

in which the calcined ceramic product is finely
ground, homogenized and then sintered.

5. Method according to claim 4,

in which the calcination is performed in a moist
nitrogen atmosphere.

6. Method for producing a ceramic material
according to one of claims 1 through 3,

in which a ceramic raw materials mixture without
a copper oxide additive is calcined, wherein during
the calcination a piezoceramic perovskite mixed-
crystal phase is formed;

in which copper oxide Cu_2O is added to a slurry,
wherein the copper oxide is evenly distributed
throughout the slurry;

in which the product of the calcination is finely ground and mixed with the slurry, forming a ceramic mass;

5 in which the ceramic mass is sintered under inert conditions.

7. Method pursuant to one of claims 4 through 6,

10 in which the sintering is performed in a moist nitrogen atmosphere.

8. Multilayer piezoelectric component with ceramic layers made from a ceramic material according to

15 one of claims 1 through 3 and internal electrode layers,

wherein the ceramic layers and the electrode layers are arranged

20 one on top of another in alternating series, wherein the internal electrodes contain at least a proportion of the metallic copper.